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DESIGN PEDAGOGY AND THE THRESHOLD OF UNCERTAINTY

Mike Tovey and Jane Osmond

There is a long tradition of teaching design through design practice in universities and colleges. The end goal for graduates is to achieve a level of capability to function as designers in the professional world. Their education helps them create a passport to enter this community of professional practice. Part of the legacy of the funding initiative in England to support research into teaching has been the development of a better understanding of a practice based approach to design pedagogy. In two centres, signature pedagogies were identified as a distinguishing characteristic for developing student capability within varieties of design practice, focusing on those elements which are characteristic of the discipline. The emphasis moves away from the content of the curriculum and towards practical, embodied and experiential ways of knowing. For product and automotive design the concept of transformative practice was identified as crucial. Designers employ two simultaneous interacting cognitive styles. From a longitudinal study it became clear that in order to develop the confidence to match these two modes of thought, neophyte designers needed to surmount a barrier, which was labelled the threshold of uncertainty. Accommodating effective arrangements to accomplish this has reinforced the importance of employing the traditional arrangement of studio teaching.

Keywords: communities of practice, CETLs, threshold concepts, luminal spaces

1 INTRODUCTION

Typically design education is based on what professional designers do, mimicking their practice. There is a greater emphasis on being able to accomplish the process of designing than being a repository of specialist knowledge. Students engage in design exercises of developing complexity which mimic professional practice. In the long tradition of teaching design in this way in our universities and colleges, the end goal is that of achieving a level of capability to function as designers in the professional world. Graduates wish to become part of the community of design practitioners and their education is the system they negotiate to enable them construct a ‘passport’ to enter this community. [1] Their design portfolio could be seen as their passport to design practice, in which they demonstrate that they can tackle design problems to a standard which is recognisably that of their professional community. They need to show that they can think in a ‘designerly’ way, engaging in a ‘solutioning’ process. Ability in creative synthesis is probably the most important ingredient in the mix which is required to achieve this passport.

2 COMMUNITIES OF PRACTICE

Across the wide spectrum of design practice there are many types of designers. Each could be considered as a separate professional community of practice. Typically a community is a group of professionally qualified people in the same discipline. Members will negotiate with and participate in a mutually understood discourse which is both explicit and, very often tacit. The signs of membership are usually clear and recognizable. The Community of Practice Theory devised by Jean Lave and Etienne Wenger [2] offers a way of understanding such groups. As a social theory of learning it highlights the value of our 'lived experience of participation in the world' [3] Within a community of practice, learning is an experience of identity formation. The accumulation of skills and information augments a process of becoming, and in the case of design this means becoming a particular kind of creative and critically minded design practitioner. Wenger call this “transformative practice”, and within design practice that can become a source of motivation, meaningfulness and personal and social

energy. Each group of designers represents a significant group of professional practitioners. We could include architects, industrial designers, design engineers, graphic designers, interaction designers, fashion designers, interior designers, craft designers, furniture designers, jewellery designers and many more.

3 THE CENTRES OF EXCELLENCE FOR TEACHING AND LEARNING

Between 2005 and 2010 there was major funding for the development of teaching and learning in universities in England. For the Higher Education Funding Council for England, the Centres for Excellence in Teaching and Learning (CETL) initiative was its largest single funding for pedagogy. Its aims were to reward excellent teaching practice, and invest in that practice. The CETLs were expected to provide substantial benefits to students, teachers and institutions. [4] 74 centres were funded across a range of universities, with a huge variety of types of pedagogic research and development across all discipline areas, and much of it interdisciplinary and collaborative. Communities of Practice figured quite significantly within their range of activities, particularly in the area of professional development. A CoP was defined as 'a group of people coming together from different disciplines or within a discipline for a common interest'. Sometimes these were formally organized within a discipline, and sometimes cross faculty, and they showed the widespread currency of the notion within the initiative.

17 of the 74 funded centres, touched on 'creative arts and design' and may have been working in areas directly relevant to design pedagogy. A much smaller number of centres had a direct location in design schools, and two of them covered work which focused directly on the development of practice based education as a preparation for entry to the design profession. They were the Creative Learning in Practice (CLIP) CETL at the University of the Arts London, and the Centre of Excellence for Product and Automotive Design (CEPAD) CETL at Coventry University

4 DEVELOPMENTS OUT OF CLIP AND CEPAD

As CLIP was based in the University of the Arts in London, it had access to a wide range of art and design disciplines across the federation of specialist colleges within the university. It was particularly well located to investigate disciplinary difference [5] and researchers were able to investigate the differences between Fine Art, Graphic Design, Fashion Product Design and Design for Performance identifying distinctive characteristics, and the spaces in which they occurred. The conclusions in this study included the importance of social approaches to teaching and assessment. It was possible to identify the signature pedagogies for particular groups which are common to such activities [6] developing in students the characteristic ways of thinking, being and acting in the discipline. There was a particular focus on the development of the community of student practice as an approach to student learning support within the course of study. [6] The key to accommodating students from a diverse background lay in more inclusive participation in learning activities where students are encouraged to undertake responsibilities with the tutors acting as facilitators or guides, emphasising partnership and collaboration over traditional didactic approaches.

Based in Art and Design, Coventry University's Centre of Excellence for Product and Automotive Design (CEPAD) has close links with the design profession, especially in transport. This has enabled it to develop what could be considered as the signature pedagogies for automotive design and product designers. They assume that in order to function effectively as designers they must engage in a designerly way of knowing. This is seen as a core capability which is shared across different types of designer. The intention could be seen as one of combining the generic designerly thinking with the domain related specialised knowledge of a signature pedagogy, to produce a level of overall capability sufficient to gain entry to the community of design practice. Cross characterizes design as an activity involving tackling 'ill-defined' problems through a 'solution-led' problem-solving approach. [7] The designer's attention oscillates between the problem and its solution, in an appositional search for a matching problem-solution pair, rather than a propositional argument from problem to solution. It would seem that the two processing modes are typically employed at the same time and interactively, and that a more complete understanding of any particular problem arises from the matching of initially separate simultaneous mental operations. The 'dual processing' strategy employed by designers involves a 'conversation' taking place between these two modes. [8] The result of this 'conversation', in what Tovey describes as an 'incubation period', enables a designer to arrive at a 'solution'. [9] This

use of a blend of different thinking styles makes it difficult for many people to understand design. But to designers, these thinking styles are so intimately connected in a design project that they seem almost merged into one way of thinking. When steeped deeply in your design activity you just keep switching between analysis and creativity, between 'problem' and 'solution' without any effort. As Lawson and Dorst note,[10] 'in practice it is often devilishly hard to distinguish between them.' The evidence from the centre's research was that for neophyte design students being able to arrive at this match and thus a solution was a threshold capability. However achieving capability is such a solutioning process involved surmounting a key barrier, which was labelled the threshold of design uncertainty.

5 THRESHOLD CONCEPTS

The threshold concept framework was first introduced by Meyer and Land in 2003. It was used in CEPAD as a research framework to interview six industrial design students twice per study year from entry in 2005, to graduation in 2010. Qualitative data was gathered from UG and PG industrial design students throughout the longitudinal study, with a total of eighty-nine students taking part in the research. The threshold concept theory posits that there are crucial transformations that take place as students progress through their studies, which relate to both specific learning events within the curriculum and also to identity transformations. Thus, grasping a threshold concept transforms a student's worldview, and equips them to move onto the next stage of their learning. Meyer and Land refer to threshold concepts as 'portals' that enable a focus on the learning episodes which facilitate understanding of transformative concepts. [11] As outlined earlier, a threshold concept was identified and is defined thus:

> *'as akin to a portal, opening up a new and previously inaccessible way of thinking about something. [It] represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress. As a consequence of comprehending a threshold concept there may thus be a transformed internal view of subject matter, subject landscape, or even world view.' [12]*

Additionally, Meyer and Land posit that threshold concepts include characteristics such as irreversibility (impossible to forget), integration (conceptual leaps within/outside discipline fields), and troublesomeness (resistance). This resistance often takes the form of previous knowledge, which can act as a barrier to acceptance. Such knowledges include *ritual* (intuitive) understanding; *inert* (stand-alone) knowledge; *conceptually* difficult knowledge – that which, if not grasped, can result in mimicry; *alien* (counter-intuitive) knowledge, and *tacit* (unseen) knowledge – often the background knowledge that informs particular disciplines or subject areas. [13] Because of these challenges, grasping threshold concepts can be uncomfortable for students, and result in unsafe conceptual spaces. Successful negotiation of these is dependent on a number of factors, such as student knowledge of the discipline 'game' before entry, confidence in deciphering the game once entered and ability to inculcate learning curves in order to move towards the next gateway. These spaces are referred to as 'liminal' (Cf variation theory), and Meyer and Land discuss four separate stages that students need to negotiate. [11] The sub-liminal stage concerns existing knowledge of the 'game' or episteme [13] which will vary according to previous educational background. The pre-liminal stage concerns the variation in how confidently students approach the threshold concept portal. The third stage concerns when they enter the portal itself – there will be variations they cope with suspension within an unsafe space, and whether or not they can pass through it. The post-liminal stage concerns the types of conceptual variations which are present in the students and how these relate to their progression.

For Meyer and Land, threshold concepts ('jewels in the curriculum') can help to inform course design by providing diagnostic points, and thus are 'literally…the waypoints to be navigated…they are what really matters in the course and where the key transformations educators wish to bring about take place.' [14]

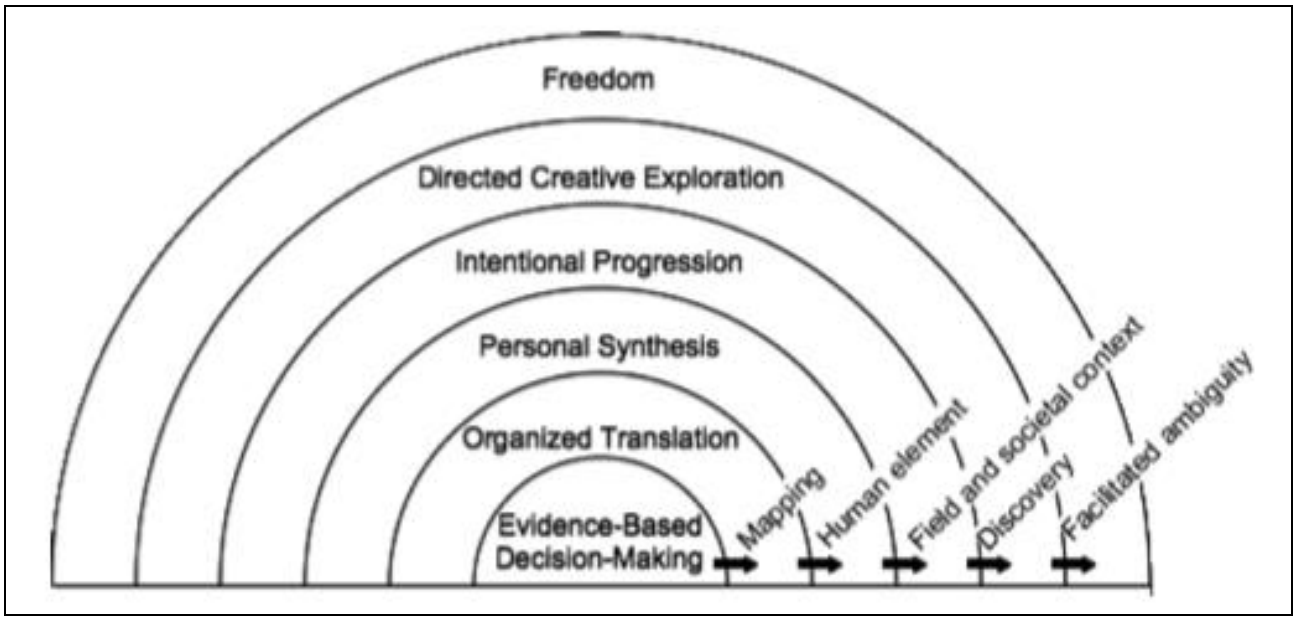
6 LIMINAL SPACES

The liminal spaces identified by Meyer and Land within the threshold concept theory, can also be found within the creativity literature, [15-18]. Further, they are also acknowledged in the design

literature. [19-22] In particular, Tovey's notion of a dual processing/incubation period, and Wallace's problem bubbles have resonance.

In terms of professional designers, Daly *et al's* work on the different lenses that designers use when approaching a brief includes 'freedom', 'which allows for facilitated ambiguity and limitless possibilities from beginning to end of the design task.' [23] To reach this stage, designers need to pass through several others (Figure 1), much in the same way that Maslow posited in the Hierarchy of Needs theory. [24]. As such Daly et al's stages can be compared to Maslow's theory in that lower level (basic) needs must be satisfied before progressing to the next level, with the ultimate aim of self-actualisation. In essence, designers begin with 'evidence-based decision-making', move towards 'organised translation, 'personal synthesis', 'intentional progression, 'directed creative exploration', and finally 'freedom'. Daly *et al* do argue that designers do not *have to* pass through previous levels in order to reach the 'freedom' stage: it is more likely that professional designers approach a task from one or more of the lenses, depending on their level of experience/preference. But it could be argued that this is the preferred aim of design teaching in higher education.

Figure 1: Outcome Space in Hierarchical Form Daly et al (2012)



7 LIMINAL SPACES AND THE ID CURRICULUM

Returning to the threshold concept research within the ID curriculum at Coventry University, as stated earlier, a threshold concept inculcating a liminal space was identified. **The toleration of design uncertainty** is defined as:

> *'…the moment when a student recognises that the uncertainty present when approaching a design brief is an essential, but at the same time routine, part of the design process.' [25]*

This threshold concept concurs with several of the characteristics outlined by Meyer and Land (Figure 2), namely that the acceptance of uncertainty is a prerequisite for the process of design, and so can be transformative and irreversible. It is also integrative, in that when students realise that by being uncertain and having to explore lots of different options, everything is a source of inspiration, not just what they learn within the studio. However, again in concurrence with Meyer and Land's characteristics, this realisation is troublesome, as it means that the students have to let go of the notion of a prescribed route to solutions.

Figure 2: threshold concept mapped against the Meyer and Land characteristics

Transformative	Students accept that the toleration of design uncertainty is the jumping off point to innovative design
Irreversible	This transformation incurs a cognitive shift in terms of students' design confidence
Integrative	Students recognise that everything they learn and experience is a legitimate source of inspiration
Troublesome	Students accept that they will constantly experience and re- experience this 'surfacing around' as they hunt for a solution, even when they attain the status of professional designer.

This threshold concept also echoes Meyer and Land's liminal variation states, in particular the sub-liminal stage. In this case, there was evidence that previous educational experiences had fostered a 'what do we need to do to pass' mentality, which is at odds with the creative curriculum requirements within higher education (not understanding the 'game'). This, in turn, affects the pre-liminal stage – the confidence in approaching the threshold concept portal, which requires a free expression of creative instincts. Consequently, some students get stuck when presented with a brief that allows them the freedom to explore and so they can remain suspended within a liminal stage while they search for understanding. How they manage this liminal stage will therefore dictate how they emerge (post-liminal) from it – if they have not accepted the uncertainty, they will return again and again to the liminal state. If they have accepted it, they will also return again and again to the liminal state, but with the confidence to negotiate it successfully.

This is echoed by an Coventry University industrial design tutor, when he points out that students may either rush at a brief or, conversely, worry about marks and so restrain their creativity. Either way, the students do not have the experience to underpin their work, particularly in terms of whether the design is feasible. This can leave them in a liminal space where they are uncertain of their approach.[25].

The context for addressing this issue was the design studio. It is the arena in which there is the opportunity to achieve the integration of ideas which is at the core of design synthesis [10]. It is also the place where students can mimic professional design activity. The ID curriculum was redesigned in order to scaffold the liminal space with robust support – namely by introducing a quadruple module with a rising scale of marks. And so, the first assignment attracted only 10% of the mark, which allowed students to experiment and, if necessary, fail. The next assignment attracted only 15%, and again the possibility of failure was allowed, as the final mark was 75% which meant that the students could experiment, succeed or fail, but most importantly build their confidence in approaching the final assignment, free from the knowledge that the first two marks would ultimately affect their final grade.

In summary, the concept of Meyer and Land's liminal spaces are well represented within both the creativity and design literature, and a particular liminal space relating to design uncertainty was identified within the early years of the industrial design course at Coventry University.

8 CONCLUSIONS

In two universities in England the initiative to support pedagogic research has produced developments which help us to understand better certain key ingredients of practice based education. A key theme has been the engagement with communities of practice. The groups of professional design practice have a particular relationship with design education which manifests itself as identifiable signature pedagogies. For industrial design students a key feature of their education involves confronting a threshold barrier which we have labelled the toleration of design uncertainty. In approaching this threshold they are entering a luminal space which is typical in creative disciplines. For design tutors who are organizing courses there is a need for arrangements which allow both a safe arena and exploratory time in which this barrier can be surmounted. Traditional design studio teaching can be organized and assessments arrangements modified so as to encourage experimentation and the development of confidence in design solutioning.

REFERENCES

[1] Tovey, M. The Passport to Practice. *Design and Designing: A Critical Introduction*, 2012, Ed. Garner, S. and Evans, C. Berg (London).

[2] Lave, J. and Wenger, E. *Situated Learning Legitimate Peripheral Participation*, 1991, Cambridge University Press (Cambridge)

[3] Wenger, E. *Communities of Practice Learning, Meaning and Identity*, 2007, Cambridge University Press (Cambridge)

[4] HEFCE *Summative evaluation of the CETL programme: Final report by SQW to HEFCE and DEL HEFCE*, 2011, Gloucester.

[5] Simms, E (2008), *Teaching Landscapes in Creative Arts Subjects. Report on the CLIP CETL funded UAL Research Project*, Retrieved on September 29, 2010 from: http://www.arts.ac.uk/docs/Landscapes-final-report.pdf

[6] Shreeve, A. Learning development and study support – an embedded approach through communities of practice. *Art, Design and Communication in Higher Education*, 2007, Vol.6 Number 1, Intellect Ltd (London)

[7] Cross, N. *Designerly Ways of Knowing*, 2006, Springer-Verlag (London).

[8] Tovey, M., Bull, K., and Osmond, J. Developing a Pedagogic Framework for Product and Automotive Design. *Design and Complexity, The Design Research Society Biennial Conference*, 2010, Montreal, Canada. Available from http://www.drs2010.umontreal

[9] Tovey, M. Design for Transport: A User Centred Approach to Vehicle Design and Travel. *Design for Social Responsibility Series*, 2012, Gower (Farnham)

[10] Lawson, B. And Dorst, K. (2009), Design Expertise, Architectural Press, Elsevie

[11] Meyer, J., Land, R,. and Davies, P. Threshold concepts and troublesome knowledge (4): Issues of variation and variability. *Threshold Concepts within the Disciplines*. ed. By Land, R., Meyer, J. and Smith, J. 2008, Sense Publishers (Rotterdam)

[12] Meyer, J., and Land, R. Threshold concepts and troublesome knowledge: linkages to ways of thinking and practising within the disciplines. *Occasional Paper 4*, 2003. Available from: http://www.etl.tla.ed.ac.uk/docs/ETLreport4.pdf. [26th September 2013]

[13] Perkins, D. quoted in Meyer, J., and Land, R. Threshold concepts and troublesome knowledge: linkages to ways of thinking and practising within the disciplines. 1999; 2003. C. Rust. ed. *Improving Student Learning Theory and Practice - 10 years on*. OCSLD (Oxford)

[14] Land, R., and Meyer, J. Threshold concepts and troublesome knowledge (5): Dynamics of Assessment. *Threshold Concepts within the Disciplines*. 2010. ed. by Land, R., Meyer, J. and Smith, J. Sense Publishers (Rotterdam)

[15] Perkins, D. *The Eureka Effect: The Art and Logic of Breakthrough thinking*, 2001, W.Norton, Incorporated.

[16] Kleiman, P. Towards transformation: conceptions of creativity in higher education. *Innovations in Education and Teaching International*, 2008. Vol. 45, No. 3, 209–217

[17] DeBono, E. Exploring patterns of thought: Serious Creativity. *Journal for Quality and Participation*, 1995, 18 (5), 12 - 18

[18] Claxton, G. (2006) Thinking at the edge: developing soft creativity. *Cambridge Journal of Education*, 1995, Vol.36. September. 351-362

[19] Cross, N., *Designerly Ways of Knowing*., 2006, Springer-Verlag (London).

[20] Dorst, K. *Understanding Design 150 Reflections on Being a Designer*, 2003, BIS (Amsterdam)

[21] Wallace, K. Some Observations on Design Thinking. *Research in design thinking*. 1992, eds. Cross, N. Dorst, K, Roozenburg N. Netherlands: Delft University Press

[22] Tovey, M. Designing with both halves of the brain' *Design Studies*, 1984, Volume 5, Number 4, 219-228

[23] Daly, S., Adams, R., Bodner, G. What Does it Mean to Design? A Qualitative Investigation of Design Professionals' Experience. *Journal of Engineering Education*, 2012, April, 101, 2, 187-

219. ASEE
[24] McLeod, S. Maslow's Hierarchy of Needs. *Simply Psychology*. 2013, Available online: http://www.simplypsychology.org/maslow.html Accessed 3 November 2013)
[25] Osmond, J. Stuck in the bubble: Identifying Threshold Concepts in Design'. *Dialogues in Art and Design: Promoting and Sharing Excellence.* GLAD Conference Proceedings. 2009, 21-22 October, York St John University